



| charge in cfs |           |             | Manganese Concentration Coefficients |                |      |           |           |
|---------------|-----------|-------------|--------------------------------------|----------------|------|-----------|-----------|
|               | Intercept | coefficient |                                      |                | B    | Intercept |           |
|               |           |             | Low Flow November-March              |                | A72  | 0.004     | 110.08249 |
| M34           | -2.771    | 0.394       | -2.28954                             | <u>0.38718</u> | M34  | 0.039     | 120.28045 |
| CC48          | 1.752     | 0.130       | 6.77165                              | <u>0.10539</u> | CC48 | 0.024     | 636.59640 |
| A68           | -11.131   | 0.498       | -3.62869                             | <u>0.45153</u> | A68  | 0.025     | 37.87432  |

Discharge Relationships among the three gages

| MONTH        | J  | F  | M  | A   | M   | J    | J   |
|--------------|----|----|----|-----|-----|------|-----|
| Intercept    | 1  | 1  | 1  | 1   | 1   | 1    | 1   |
| A 72         | 64 | 63 | 77 | 155 | 682 | 1196 | 624 |
| M34          | 22 | 22 | 28 | 58  | 266 | 468  | 243 |
| CC48         | 14 | 13 | 15 | 22  | 91  | 158  | 83  |
| A68          | 25 | 25 | 31 | 66  | 329 | 585  | 300 |
| Ground water | 3  | 3  | 3  | 9   | -3  | -14  | -2  |

1/(1+BQ) Discharge Representation

|      |        |        |        |        |        |        |        |
|------|--------|--------|--------|--------|--------|--------|--------|
| A 72 | 0.7962 | 0.7987 | 0.7645 | 0.6173 | 0.2682 | 0.1729 | 0.2860 |
| M34  | 0.5327 | 0.5371 | 0.4823 | 0.3056 | 0.0880 | 0.0519 | 0.0955 |
| CC48 | 0.7551 | 0.7565 | 0.7368 | 0.6548 | 0.3148 | 0.2090 | 0.3339 |
| A68  | 0.6128 | 0.6171 | 0.5623 | 0.3771 | 0.1085 | 0.0640 | 0.1178 |

Date variables

|         |        |        |         |         |         |         |         |
|---------|--------|--------|---------|---------|---------|---------|---------|
| sin     | 0.1552 | 0.6358 | 0.9276  | 0.9887  | 0.7862  | 0.3629  | -0.1441 |
| cos     | 0.9879 | 0.7719 | 0.3737  | -0.1496 | -0.6180 | -0.9318 | -0.9896 |
| sin1    | 0.3066 | 0.9815 | 0.6932  | -0.2959 | -0.9717 | -0.6763 | 0.2852  |
| cos1    | 0.9518 | 0.1916 | -0.7207 | -0.9552 | -0.2361 | 0.7366  | 0.9585  |
| Consent | 1      | 1      | 1       | 1       | 1       | 1       | 1       |

|     |           |        |        |         |         |         |         |
|-----|-----------|--------|--------|---------|---------|---------|---------|
| A72 | Intercept | 1      | 1      | 1       | 1       | 1       | 1       |
|     | BQ        | 0.7962 | 0.7987 | 0.7645  | 0.6173  | 0.2682  | 0.1729  |
|     | sin       | 0.1552 | 0.6358 | 0.9276  | 0.9887  | 0.7862  | 0.3629  |
|     | cos       | 0.9879 | 0.7719 | 0.3737  | -0.1496 | -0.6180 | -0.9318 |
|     | sin1      | 0.3066 | 0.9815 | 0.6932  | -0.2959 | -0.9717 | -0.6763 |
|     | cos1      | 0.9518 | 0.1916 | -0.7207 | -0.9552 | -0.2361 | 0.7366  |
|     | Consent   |        |        |         |         |         |         |

**A72 Concentration** **1101** **1293** **1423** **1280** **691** **328** **295**

|     |           |        |        |         |         |         |         |
|-----|-----------|--------|--------|---------|---------|---------|---------|
| M34 | Intercept | 1      | 1      | 1       | 1       | 1       | 1       |
|     | BQ        | 0.5327 | 0.5371 | 0.4823  | 0.3056  | 0.0880  | 0.0519  |
|     | sin       | 0.1552 | 0.6358 | 0.9276  | 0.9887  | 0.7862  | 0.3629  |
|     | cos       | 0.9879 | 0.7719 | 0.3737  | -0.1496 | -0.6180 | -0.9318 |
|     | sin1      | 0.3066 | 0.9815 | 0.6932  | -0.2959 | -0.9717 | -0.6763 |
|     | cos1      | 0.9518 | 0.1916 | -0.7207 | -0.9552 | -0.2361 | 0.7366  |
|     | Consent   | 1.0000 | 1.0000 | 1.0000  | 1.0000  | 1.0000  | 1.0000  |

M34 Concentration **510** **536** **508** **369** **177** **105** **115**

|                      |           |             |             |             |             |            |            |            |
|----------------------|-----------|-------------|-------------|-------------|-------------|------------|------------|------------|
| CC 48                | Intercept | 1           | 1           | 1           | 1           | 1          | 1          | 1          |
|                      | BQ        | 0.7551      | 0.7565      | 0.7368      | 0.6548      | 0.3148     | 0.2090     | 0.3339     |
|                      | sin       | 0.1552      | 0.6358      | 0.9276      | 0.9887      | 0.7862     | 0.3629     | -0.1441    |
|                      | cos       | 0.9879      | 0.7719      | 0.3737      | -0.1496     | -0.6180    | -0.9318    | -0.9896    |
|                      | sin1      | 0.3066      | 0.9815      | 0.6932      | -0.2959     | -0.9717    | -0.6763    | 0.2852     |
|                      | cos1      | 0.9518      | 0.1916      | -0.7207     | -0.9552     | -0.2361    | 0.7366     | 0.9585     |
|                      | Consent   | 1.0000      | 1.0000      | 1.0000      | 1.0000      | 1.0000     | 1.0000     | 1.0000     |
| CC 48 Concentratrion |           | <b>1831</b> | <b>1810</b> | <b>1877</b> | <b>1802</b> | <b>933</b> | <b>451</b> | <b>534</b> |

|                          |           |             |             |             |             |             |            |            |
|--------------------------|-----------|-------------|-------------|-------------|-------------|-------------|------------|------------|
| A68                      | Intercept | 1           | 1           | 1           | 1           | 1           | 1          | 1          |
|                          | BQ        | 0.6128      | 0.6171      | 0.5623      | 0.3771      | 0.1085      | 0.0640     | 0.1178     |
|                          | sin       | 0.1552      | 0.6358      | 0.9276      | 0.9887      | 0.7862      | 0.3629     | -0.1441    |
|                          | cos       | 0.9879      | 0.7719      | 0.3737      | -0.1496     | -0.6180     | -0.9318    | -0.9896    |
|                          | sin1      | 0.3066      | 0.9815      | 0.6932      | -0.2959     | -0.9717     | -0.6763    | 0.2852     |
|                          | cos1      | 0.9518      | 0.1916      | -0.7207     | -0.9552     | -0.2361     | 0.7366     | 0.9585     |
|                          | Consent   | 1.0000      | 1.0000      | 1.0000      | 1.0000      | 1.0000      | 1.0000     | 1.0000     |
| <b>A68 Concentration</b> |           | <b>1895</b> | <b>2270</b> | <b>2435</b> | <b>2069</b> | <b>1216</b> | <b>731</b> | <b>549</b> |

|                              |   |   |   |   |   |   |   |
|------------------------------|---|---|---|---|---|---|---|
| Concentration in Groundwater | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|------------------------------|---|---|---|---|---|---|---|

Load in pounds per day

|              |      |      |      |      |      |      |      |
|--------------|------|------|------|------|------|------|------|
| Sum          | 454  | 499  | 636  | 1068 | 2869 | 2957 | 1279 |
| A72          | 380  | 440  | 592  | 1071 | 2544 | 2120 | 994  |
| % Difference | 0.19 | 0.13 | 0.07 | 0.00 | 0.13 | 0.40 | 0.29 |
| RPD          | 0.18 | 0.13 | 0.07 | 0.00 | 0.12 | 0.33 | 0.25 |

ganese Concentration Coefficients

| BQ         | sin       | cos       | sin1       | cos1              | Consent           |
|------------|-----------|-----------|------------|-------------------|-------------------|
| 1300.01851 | 258.05023 | 32.88141  | -22.83880  | <u>-115.51468</u> | 0.000             |
| 676.85542  | 28.85039  | 45.76225  | 2.36955    | <u>-21.93733</u>  | 0                 |
| 2418.14462 | 55.02265  | 133.79117 | -163.86850 | <u>-115.75164</u> | <u>-611.58877</u> |
| 2357.47898 | 524.74014 | 10.67654  | -7.02235   | <u>-157.22271</u> | <u>472.32632</u>  |

| A   | S   | O   | N  | D  |
|-----|-----|-----|----|----|
| 1   | 1   | 1   | 1  | 1  |
| 268 | 187 | 142 | 92 | 70 |
| 103 | 71  | 53  | 33 | 25 |
| 37  | 26  | 20  | 16 | 14 |
| 122 | 82  | 60  | 38 | 28 |
| 6   | 8   | 9   | 4  | 3  |

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.4826 | 0.5721 | 0.6378 | 0.7310 | 0.7813 |
| 0.1997 | 0.2657 | 0.3255 | 0.4348 | 0.5082 |
| 0.5317 | 0.6145 | 0.6727 | 0.7167 | 0.7465 |
| 0.2464 | 0.3278 | 0.4016 | 0.5134 | 0.5884 |

|         |         |         |         |         |
|---------|---------|---------|---------|---------|
| -0.6271 | -0.9360 | -0.9878 | -0.7716 | -0.3573 |
| -0.7789 | -0.3521 | 0.1556  | 0.6361  | 0.9340  |
| 0.9769  | 0.6591  | -0.3074 | -0.9816 | -0.6674 |
| 0.2135  | -0.7521 | -0.9516 | -0.1908 | 0.7447  |

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 |
|---|---|---|---|---|

|         |         |         |         |         |
|---------|---------|---------|---------|---------|
| 1       | 1       | 1       | 1       | 1       |
| 0.4826  | 0.5721  | 0.6378  | 0.7310  | 0.7813  |
| -0.6271 | -0.9360 | -0.9878 | -0.7716 | -0.3573 |
| -0.7789 | -0.3521 | 0.1556  | 0.6361  | 0.9340  |
| 0.9769  | 0.6591  | -0.3074 | -0.9816 | -0.6674 |
| 0.2135  | -0.7521 | -0.9516 | -0.1908 | 0.7447  |

**503      673      806      927      993**

|         |         |         |         |         |
|---------|---------|---------|---------|---------|
| 1       | 1       | 1       | 1       | 1       |
| 0.1997  | 0.2657  | 0.3255  | 0.4348  | 0.5082  |
| -0.6271 | -0.9360 | -0.9878 | -0.7716 | -0.3573 |
| -0.7789 | -0.3521 | 0.1556  | 0.6361  | 0.9340  |
| 0.9769  | 0.6591  | -0.3074 | -0.9816 | -0.6674 |
| 0.2135  | -0.7521 | -0.9516 | -0.1908 | 0.7447  |
| 1.0000  | 1.0000  | 1.0000  | 1.0000  | 1.0000  |

**199      275      339      423      479**

|            |             |             |             |             |
|------------|-------------|-------------|-------------|-------------|
| 1          | 1           | 1           | 1           | 1           |
| 0.5317     | 0.6145      | 0.6727      | 0.7167      | 0.7465      |
| -0.6271    | -0.9360     | -0.9878     | -0.7716     | -0.3573     |
| -0.7789    | -0.3521     | 0.1556      | 0.6361      | 0.9340      |
| 0.9769     | 0.6591      | -0.3074     | -0.9816     | -0.6674     |
| 0.2135     | -0.7521     | -0.9516     | -0.1908     | 0.7447      |
| 1.0000     | 1.0000      | 1.0000      | 1.0000      | 1.0000      |
| <b>987</b> | <b>1391</b> | <b>1779</b> | <b>1984</b> | <b>1959</b> |

|            |            |             |             |             |
|------------|------------|-------------|-------------|-------------|
| 1          | 1          | 1           | 1           | 1           |
| 0.2464     | 0.3278     | 0.4016      | 0.5134      | 0.5884      |
| -0.6271    | -0.9360    | -0.9878     | -0.7716     | -0.3573     |
| -0.7789    | -0.3521    | 0.1556      | 0.6361      | 0.9340      |
| 0.9769     | 0.6591     | -0.3074     | -0.9816     | -0.6674     |
| 0.2135     | -0.7521    | -0.9516     | -0.1908     | 0.7447      |
| 1.0000     | 1.0000     | 1.0000      | 1.0000      | 1.0000      |
| <b>713</b> | <b>902</b> | <b>1092</b> | <b>1359</b> | <b>1607</b> |

|   |   |   |   |   |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
|---|---|---|---|---|

|      |      |      |      |      |
|------|------|------|------|------|
| 777  | 701  | 644  | 531  | 457  |
| 728  | 679  | 618  | 460  | 376  |
| 0.07 | 0.03 | 0.04 | 0.15 | 0.22 |
| 0.07 | 0.03 | 0.04 | 0.14 | 0.19 |

A72

Chronic TVS at A72  
a2 b2

|    |         |        |
|----|---------|--------|
| Cd | -3.49   | 0.7852 |
| Cu | -1.7428 | 0.8545 |
| Mn | 5.8743  | 0.3331 |
| Zn | 0.8669  | 0.8473 |

Prediction Equation Coefficients  
Hardness Aluminum Cadmium

|           |         |          |        |
|-----------|---------|----------|--------|
| B         | 0.006   | 1.000    | 0.006  |
| Intercept | 82.304  | -26.540  | 1.020  |
| BQ        | 200.676 | 5610.562 | 1.466  |
| sin       | 16.936  | 158.116  | 0.599  |
| cos       | 48.860  | 40.749   | 0.066  |
| sin1      | 15.385  | 127.998  | -0.265 |
| cos1      | -5.633  | 6.691    | -0.292 |
| Consent   |         |          |        |

| Month    | J    | F    | M    | A    | M    | J    | J    |
|----------|------|------|------|------|------|------|------|
| Q        | 64   | 63   | 77   | 155  | 682  | 1196 | 624  |
| Hardness | 277  | 290  | 268  | 196  | 91   | 53   | 72   |
| Al ch    | 87   | 87   | 87   | 87   | 87   | 87   | 87   |
| Cd ch    | 2.5  | 2.6  | 2.5  | 1.9  | 1.1  | 0.7  | 0.9  |
| Cu ch    | 11   | 11   | 10   | 8    | 4    | 3    | 3    |
| Mn ch    | 2317 | 2352 | 2290 | 2064 | 1598 | 1333 | 1482 |
| Zn ch    | 279  | 290  | 271  | 208  | 109  | 68   | 90   |

M 34

## Prediction equation coefficients

Hardness Aluminum Cadmium Copper Iron Zinc

|           |           |            |          |           |           |           |
|-----------|-----------|------------|----------|-----------|-----------|-----------|
| B         | 0.013     | 1.00       | 0.021    | 0.123     | 0.06521   | 0.021     |
| Intercept | 60.05228  | 15.10361   | 0.91724  | 14.65129  | 77.70523  | 05.25873  |
| BQ        | 205.02801 | 38.29032   | 0.60966  | 00.98354  | 70.29706  | 78.11589  |
| sin       | 9.24827   | 69.03843   | 0.26911  | 14.16661  | -89.38888 | 88.77920  |
| cos       | 32.30173  | 79.08681   | 0.20991  | 10.17487  | 38.04002  | 85.94018  |
| sin1      |           | 435.43127  | -0.12214 | 1.04278   | 86.24646  | -17.99615 |
| cos1      |           | 123.10453  | -0.14689 | -3.82920  | -12.30367 | -45.60154 |
| consent   |           | -265.10754 |          | -10.75402 | 35.80515  | -98.00378 |

| MONTH        | J      | F   | M   | A   | M   | J   | J   |
|--------------|--------|-----|-----|-----|-----|-----|-----|
| Avg monthly  | Q      | 22  | 22  | 28  | 58  | 266 | 468 |
| Hardness     | 255    | 241 | 226 | 170 | 86  | 60  | 76  |
| Chronic Stan | Al, ch | 87  | 87  | 87  | 87  | 87  | 87  |
|              | Cd, ch | 2.4 | 2.3 | 2.1 | 1.7 | 1.0 | 0.8 |
|              | Cu ch  | 20  | 19  | 18  | 14  | 8   | 6   |

|       |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|
| Mn    | 2253 | 2212 | 2163 | 1969 | 1571 | 1389 | 1504 |
| Zn ch | 260  | 248  | 235  | 185  | 104  | 76   | 93   |

### A68 Animas at Silverton

#### Prediction equation coefficients

Hardness Cadmium Copper Manganese Zinc

|           |         |        |        |          |          |
|-----------|---------|--------|--------|----------|----------|
| B         | 0.011   | na     | na     | 0.010    | 0.016    |
| Intercept | 37.945  | 2.395  | 5.783  | 258.473  | 304.617  |
| BQ        | 165.600 |        |        | 1371.923 | 644.136  |
| sin       |         | 1.712  | 2.049  | 611.024  | 315.451  |
| cos       |         | 0.140  | 0.729  | 81.662   | -18.603  |
| sin1      |         | -0.250 | -1.520 | 16.031   | -33.783  |
| cos1      |         | -1.185 | -0.472 | -263.628 | -140.108 |
| May       |         | -1.936 | 2.261  | -258.699 |          |
| consent   |         | -0.714 | -1.828 | 411.428  | -67.174  |

| Animas R   | Month    | J    | F    | M    | A    | M    | J    | J    |
|------------|----------|------|------|------|------|------|------|------|
|            |          | Q    | 25   | 25   | 31   | 66   | 329  | 585  |
|            | Hardness | 168  | 168  | 161  | 134  | 74   | 60   | 76   |
|            | Cd,tvs   | 1.7  | 1.7  | 1.7  | 1.4  | 0.9  | 0.8  | 0.9  |
|            | Cu tvs   | 14   | 14   | 13   | 11   | 7    | 6    | 7    |
|            | Mn tvs   | 1959 | 1961 | 1934 | 1818 | 1491 | 1393 | 1509 |
| onic stand | Zn tvs   | 182  | 183  | 177  | 151  | 91   | 77   | 94   |

ction Equation Coefficients

| Copper  | Iron     | Zinc    |
|---------|----------|---------|
| 0.100   | 0.048    | 0.014   |
| 11.592  | 325.430  | 272.266 |
| -11.516 | 6156.248 | 697.432 |
| 5.618   | 310.323  | 155.229 |
| 5.955   | 262.025  | 37.490  |
| 1.700   | -72.066  | -37.359 |
| -0.594  | -177.065 | -77.421 |
| -1.491  |          |         |

| A    | S    | O    | N    | D    |
|------|------|------|------|------|
| 268  | 187  | 142  | 92   | 70   |
| 124  | 158  | 182  | 215  | 248  |
| 87   | 87   | 87   | 87   | 87   |
| 1.3  | 1.6  | 1.8  | 2.1  | 2.3  |
| 5    | 7    | 7    | 9    | 10   |
| 1772 | 1920 | 2013 | 2129 | 2233 |
| 141  | 173  | 195  | 225  | 255  |

Acute TVS at M34 Chronic TVS at M34

a2 b2 a3 b3

|    |         |        |         |        |
|----|---------|--------|---------|--------|
| Cd | -3.828  | 1.128  | -3.49   | 0.7852 |
| Cu | -0.7703 | 0.9422 | -1.7428 | 0.8545 |
| Mn | 4.4995  | 0.7893 | 5.8743  | 0.3331 |
| Zn | 0.8904  | 0.8473 | 0.8669  | 0.8473 |

| A   | S   | O   | N   | D   |
|-----|-----|-----|-----|-----|
| 103 | 71  | 53  | 33  | 25  |
| 126 | 151 | 192 | 217 | 253 |
| 87  | 87  | 87  | 87  | 87  |
| 1.4 | 1.6 | 1.9 | 2.1 | 2.3 |
| 11  | 13  | 16  | 17  | 20  |

|      |      |      |      |      |
|------|------|------|------|------|
| 1783 | 1892 | 2050 | 2136 | 2246 |
| 144  | 167  | 205  | 227  | 258  |

Chronic TVS at A68

a2            b2

|    |         |        |
|----|---------|--------|
| Cd | -3.49   | 0.7852 |
| Cu | -1.7428 | 0.8545 |
| Mn | 5.8743  | 0.3331 |
| Zn | 0.8669  | 0.8473 |

| A    | S    | O    | N    | D    |
|------|------|------|------|------|
| 122  | 82   | 60   | 38   | 28   |
| 109  | 125  | 138  | 155  | 165  |
| 1.2  | 1.4  | 1.5  | 1.6  | 1.7  |
| 10   | 11   | 12   | 13   | 14   |
| 1695 | 1777 | 1836 | 1908 | 1947 |
| 126  | 142  | 155  | 171  | 180  |